PTO Operation

The 3500/4500/5500 Ram Chassis Cab vehicle, when equipped with either the automatic Aisin 6spd or manual G-56 6spd transmissions, will allow for an aftermarket upfit with a transmission driven PTO (power take off). The customer will have the ability to operate the PTO in either a "stationary" or "mobile" mode. The vehicles will be factory set to the "stationary" mode. In order to select the "mobile" mode a Chrysler Group LLC Dealership is required to modify the vehicles settings using their proprietary Dealer service tool.

Stationary Mode

To operate the PTO in this mode the vehicle must meet the following conditions:

- Be in "park" position (vehicles equipped with automatic transmission)
- Upfitter provider (on/off) switch has been activated
- Parking brake applied (vehicles equipped with manual transmission)
- Vehicle must be running
- No vehicle, brake or clutch switch faults present
- PTO must be correctly installed using the vehicle provided circuits

The customer has the choice to operate the PTO by utilizing the cruise control switches or by utilizing a remote control (provided by the PTO supplier). To operate the feature using the cruise control switches the customer must first activate the up fitter provided on/off switch. Next, the cruise control "on" switch is selected. Following this step the "set" switch must be depressed. The vehicle is now in the PTO mode and is ready for use. In order to increase or decrease the engine idle speed, to optimize the PTO function, the "accel" and "decel" cruise switches can be used respectively.
To disengage PTO operation and return to "standard vehicle operation" simply turn the up fitter provided on/off switch to the off position.

To operate the PTO via a remote switch the customer must make sure the above conditions are met. It is vital for proper operation that the PTO and remote have been installed correctly paying special attention to ensure the vehicle provided wiring has been connected properly. This is the responsibility of the installer of the PTO and switches/remote system. It is the responsibility of the PTO manufacturer to ensure that their electrical (switches and remote) system is compatible with the vehicle's electrical architecture and software functionality.

Mobile Mode

To operate the PTO in this mode the vehicle must meet the following conditions:

- Dealer selected "mobile" mode activated via Dealer proprietary service tool
- Upfitter provider (on/off) switch has been activated
- Vehicle must be in "park" or "drive" position (vehicles equipped with automatic transmission)

- Parking brake must not be applied
- No vehicle, brake or clutch switch faults present
- Vehicle must be running
- PTO must be correctly installed using the vehicle provided circuits

The customer may choose to use the PTO while the vehicle is moving. To do so the PTO function must be activated prior to taking the vehicle out of "park". This is accomplished by activating the up-fitter provided PTO on/off switch. At this point the customer may place the vehicle in a forward or reverse gear and have PTO operation.
To disengage PTO operation and return to "standard vehicle operation" simply turn the up fitter provided on/off switch to the off position.

NOTE: For application specific information with respect to PTO and pump requirements and additional vehicle information (wiring schematics, preset idle values, engine speed limits, and vehicle hardware and software requirements) please refer to the Ram Body Builders Guide by accessing "Wiring Diagrams" and choosing the appropriate links.

Cummins Feature Description (6.7L Diesel)

ECM: Engine Control Module
FCI: 10 Way Connector located @ left side bell housing **(for 2007 MY only)**

Idle up

I/O – ECM Pins B40 & B56

Developed to aid Cabin Heating by elevating the idle speed upon operator command through the steering wheel mounted cruise switches.

To engage, the operator first presses the Cruise On switch. Then pressing and releasing the Set switch. The feature engages and engine speed increases to 900 RPM.

The operator may "ramp" the engine speed up to 2000 RPM by holding the Res Accel switch. The operator may "ramp" the engine speed down to 900 RPM by holding the Coast switch.

When Idle Up is engaged it can be disabled several ways. The Cruise Cancel switch, pressing the brake pedal, moving the PRNDL from Park or Neutral or vehicle speed greater than 2 MPH will disable Idle Up.

Several calibrations are available for Idle Up. The engine speed range, max engine torque and engine speed ramp rate for example.

Stationary PTO

I/O – ECM B16 – FCI Conn pin 9 Circuit K425

This feature interacts with the transmission to utilize an auxiliary shaft to drive equipment. Activated by a switch inside the cab, this feature operates only when the vehicle is stationary. The input is switched to ground.

Once active, the engine speed increased by holding the RES ACCEL button on the steering wheel or decreased by holding the COAST button.

Stationary PTO is available only when the vehicle is stationary. When the truck is equipped with an automatic transmission, it must be in Park and the service brake must be released and functional. When the truck is equipped with a manual transmission, the Parking Brake must be Set and the service brake must be released and functional.

Remote PTO

I/O ECM Pin B18 – FCI Conn pin 7 Circuit F425

This feature interacts with the transmission to utilize an auxiliary shaft to drive equipment. Activated by a switch outside of the cab, this feature operates only when the vehicle is stationary. The input is switched to ground.

Once active, the engine speed is changed when the switch changes from Off (open circuit) to On (closed to ground) or toggled in less than ½ second. Toggling the switch On-Off-On triggers the engine to change to the next calibrated engine speed. This can be repeated for up to five engine speed settings. Repeated toggles cycles through the engine speed 1-2-3-4-5-1-2 and so on.

Remote PTO feature has a higher priority than Idle Up. If the Remote PTO feature is active the Idle Up switches are ineffective. The Idle Up or Stationary PTO feature cannot be activated until the Remote PTO relinquishes control

Mobile PTO

Enabled via the StarScan unit at the Dealer

This feature interacts with the transmission auxillary shaft. The feature is activated by a switch (closed to ground) in the cab after selected by a service tool. When active, this feature limits engine speed and road speed to calibrated values.
When this feature is selected stationary PTO and Remote PTO features are not available.

Remote Throttle and Remote Throttle Switch

I/O:

Remote Throttle Switch – ECM B8 – FCI conn Pin 4	Circuit K129
Remote Throttle Signal – ECM B37 – FCI conn Pin 3	Circuit K128
Remote Throttle 5 Volt Supply – ECM B27 – FCI conn Pin 1	Circuit K854
Remote Throttle Sensor Return – ECM B28 – FCI conn Pin 2	Circuit K400

This feature allows the user of a continuously variable throttle. This throttle potentiometer is power by the 5 volt supply and sensor return lines provided.
This feature is activated when the Remote Throttle Switch is On (closed to ground) and the main throttle is closed. Remote Throttle does not require idle validation switches and is not to be used for main vehicle accelerator.
*MUST BE ENABLED BY DEALER!

Accelerator Interlock

I/O – ECM B17 – FCI conn Pin 6 Circuit K810
This feature disables accelerator control of the engine speed when indicates a desired condition. The desired condition is indicated by a switch closed to ground.

Switch Return

I/O – ECM B33 – FCI conn Pin 8 Circuit V937
Electrical return/ground for switch circuits.

Number of Remote PTO Speed Settings
Total number of engine speed selections available to Remote PTO feature 5.

Electrical Connection to the Vehicle at Bell Housing

The vehicle wiring provides an easy access point to connect your PTO. For the 2007 model year vehicles there is a 10 way connector located on the left side of the vehicle near the bell housing of the transmission. For 2008 and beyond the connector has been removed leaving only the blunt cut wires with heat shrink tubing on the ends. For all model years the circuits are in the same location. The circuits at this location along with the circuits found near the brake booster and inside the vehicle are provided for PTO integration to the vehicle's electrical system.

LEARNING SET SPEED

NOTE: This Feature Requires Engine Calibration Software released in December 2008:
If your vehicle was produced before December 2008, you must have the dealer "Reflash" the engine controller to December 2008 or later engine software.

In order for this feature to work the PTO MUST be wired as REMOTE PTO (pto switch between F425 and V937) not standard PTO.

- Key ON (Engine not running)
- Press and release Cruise SET button 5 times within 10 seconds
- Start Engine (Engine Running)
- Go into IDLEUP Mode (Cruise ON then SET to go to 900 RPM)
- Set the desired speed (using cruise switches)
- Press Cancel
- Turn Engine Off and Remove Key

UNLEARNING SET SPEED

- Key ON (Engine not run)
- Press and release Cruise Set button 5 times within 10 seconds.

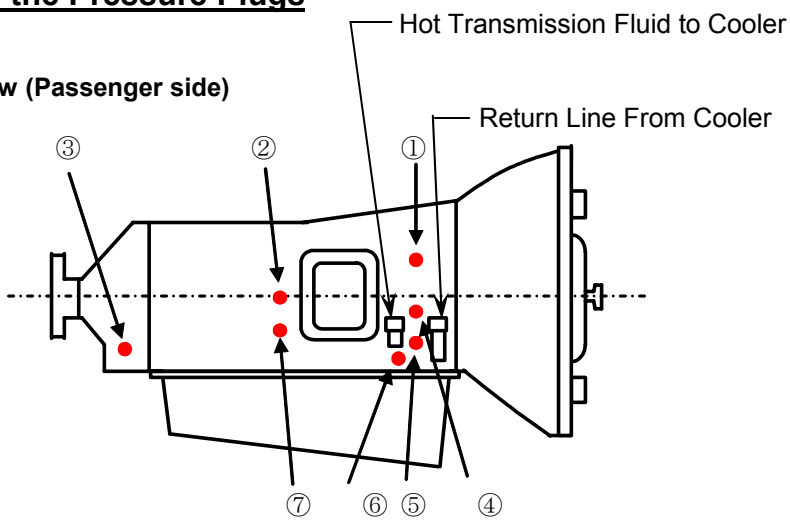
Note: To LEARN a new speed, first UNLEARN the old speed

- Once the idle speed is LEARNED, the engine will go to that idle speed whenever the Remote PTO switch is turned on, without additional operator assistance.
- PTO will engage first and then the idle speed will ramp up to the LEARNED speed, thus not violating the AISIN requirement of not allowing PTO engagement above 1000 RPM.
- The LEARNED speed is saved at power down.

Description of Pressure Ports for the Aisin Transmission. PTO Pressure Line to be connected only to #9 Line Main Pressure.

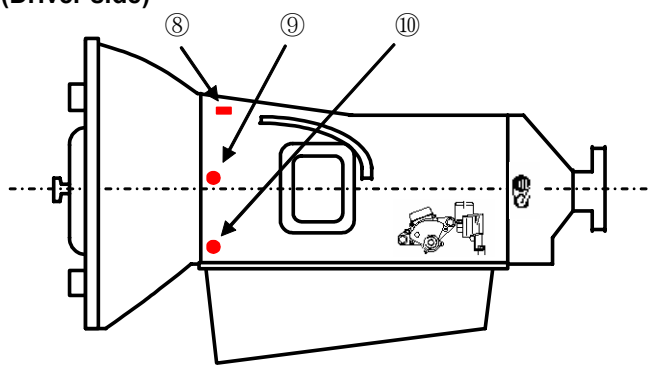
Location of the Pressure Plugs

Right Side Veiw (Passenger side)



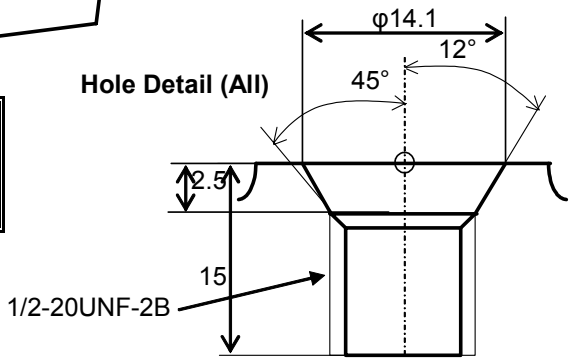
①	Torque Converter Out (to Cooler)	⑤	C1 (Clutch No1) Pressure
②	B1 (Brake No1) Pressure	⑥	C2 (Clutch No2) Pressure
③	B2 (Brake No2) Pressure	⑦	C3 (Clutch No3) Pressure
④	L/U (Lock Up Clutch) Pressure		

Left Side Veiw (Driver side)



⑧	Lubrication
⑨	Line (Main) Pressure
⑩	Torque Converter In (from Cooler)

Hole Detail (All)



PTO Troubleshooting

In response to many questions to the body builder's hotline about correctly wiring PTO systems, the Ram Truck Commercial team has created this troubleshooting guide.

Wiring Types

Trucks have used three different types of PTO wiring on our chassis cab models. Referring to the schematic diagrams, all Diesel models have common locations for: PTO ground Z914 (black) and PTO 12V power F922 (pink/red) these are always located as blunt cut wires in the engine compartment above the master cylinder on the dash panel. On the Diesel automatic the K427 (Orange/Green) wire which becomes a ground when in PTO mode is also always located in this same area.

The V937 (Violet/Brown) and K425 (Pink/Yellow) are the two wires which when connected send and receive the signal to enter PTO mode. These wires are in three different locations depending on date of build.

1. 2007 Model Year (3500 Models only): these two wires are in a ten pin connector located on a bracket attached to the left hand side of the transmission bell housing above and rearward of the starter motor. It is a separate connector that contains an empty 'dummy' connector that can be removed to allow connection of the mating connector on some PTO manufacturers wiring harnesses.
2. 2008 Model Year (All 3500/4500/5500 Models) Built from September 2007 until December 15, 2007 have the following condition: There are two K425 (Pink/Yellow) wires above the master cylinder area. Simply tie these two wires together and connect them to the mating wire on the PTO harness.
   There are also two (Violet/Brown) wires but only one is V937. They are located as blunt cut wires at the left side of the bell housing above the starter motor. Only one of these wires is the correct V937 wire. To determine the correct wire you must test for voltage with the key in the on position. The correct wire has zero volts. The incorrect wire has five volts. Connect the wire with the zero volt reading to the mating wire on the PTO harness.
3. 2008 Model Year (All 3500/4500/5500 Models) Built after January 1, 2008 have the K425 (Pink/Yellow) and V9237 (Violet/Brown) wires available in the upfitter jumper that comes in the plastic bag. This connects to the mating connector located at the dash panel between the brake and park brake pedals where the main engine to instrument panel wiring harness goes through the dash panel.

PTO System Test

Below are two methods to test the truck's idle up and PTO mode systems. This is helpful to confirm that the truck software is correctly configured and that the PTO mode still correctly functions.
It is possible that an incorrect connection during the PTO installation process can set a fault code in the powertrain control module and disable the PTO mode until the fault is cleared at the dealer.

Method one.
With the vehicle idling, in park, turn on the cruise control switch and then press the set button. The engine speed should immediately increase to 900 RPM. If it does not, there is an issue with the idle up/PTO mode.
Method Two.
With the vehicle idling in park connect the V937 and the K425 wires described above. The engine speed should immediately increase to 900RPM. If it does not, you are either using the incorrect wires or there is an issue with the idle up/PTO mode.

PTO Usage with Remote Start

If the PTO is being used in conjunction a remote start device, the PTO switch must be turned off and then turned back on after each restart. To automate this function, many upfitters have been adding a timer function to the remote start logic that turns on the PTO switch after 10-15 seconds.

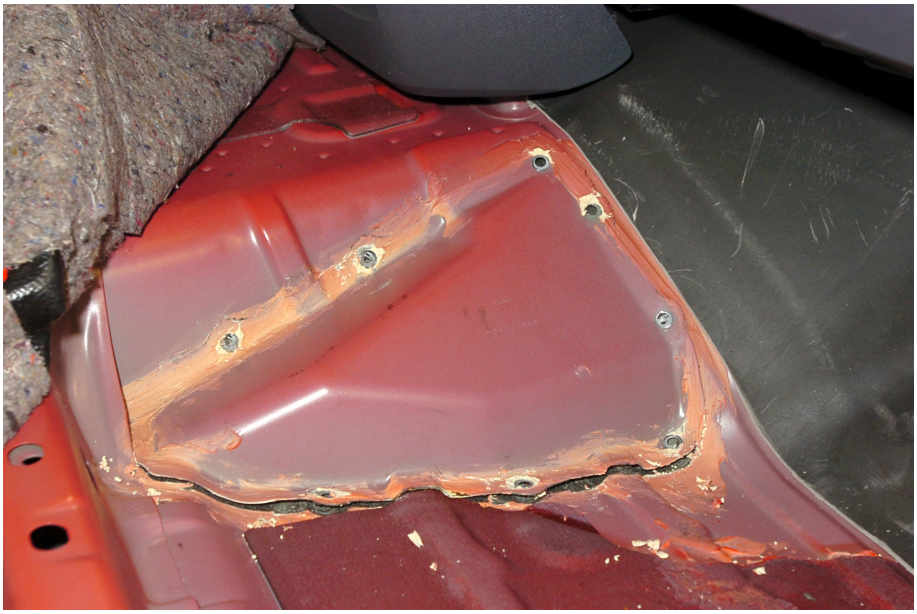
PTO Installation Alternative

In addition to the current method of PTO installation from beneath the vehicle, an alternative method has been developed that allows the installation from above by removing the PTO patch panel in the floor. The instructions are as follows.

1. Remove the rear package tray located behind the seat from the vehicle.

2. Unbolt the seat and move it to the rear of the cabin where the package tray was removed.
3. Remove the sill guards (rocker panel covers) passenger side to allow the vinyl floor mat to be lifted. They are removed by prying straight up to disengage metal clips.

4. Lift the floor mat and fold it rearward and toward the drivers side to expose the patch panel



5. Remove the fasteners and sealer from around the patch panel. Cut away the sound deadener pad to expose the transmission PTO access.

6. You are now able to install and assemble the PTO and pump through the opening. Note: larger pumps must be inserted through the hole and moved toward the rear of the opening before installing the PTO. The pump is then slid forward to connect to the installed PTO.

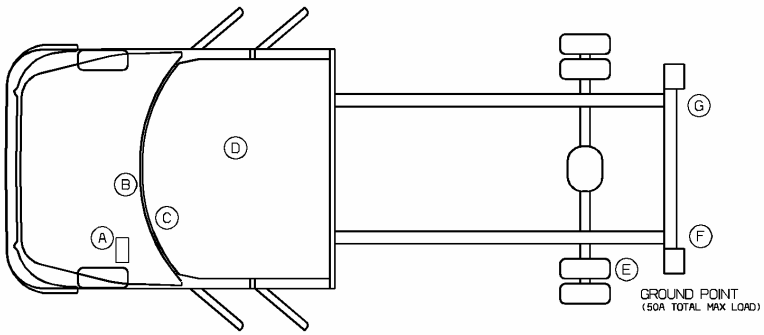
7. To assemble, reverse the above procedure using RTV to reseal the PTO floor pan patch panel.

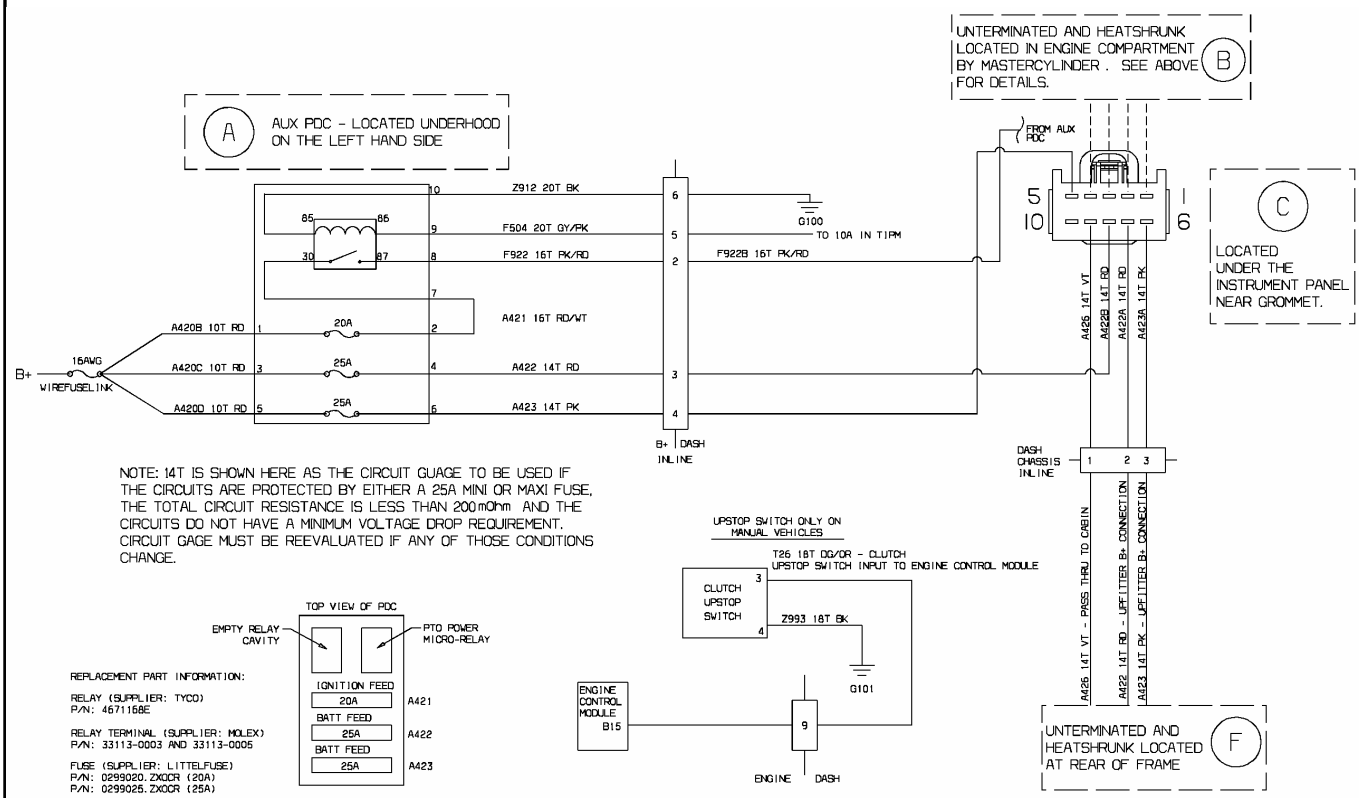
PTO Circuit Definition Chart

The following chart is provided to assist in correctly interfacing the PTO with the vehicle:

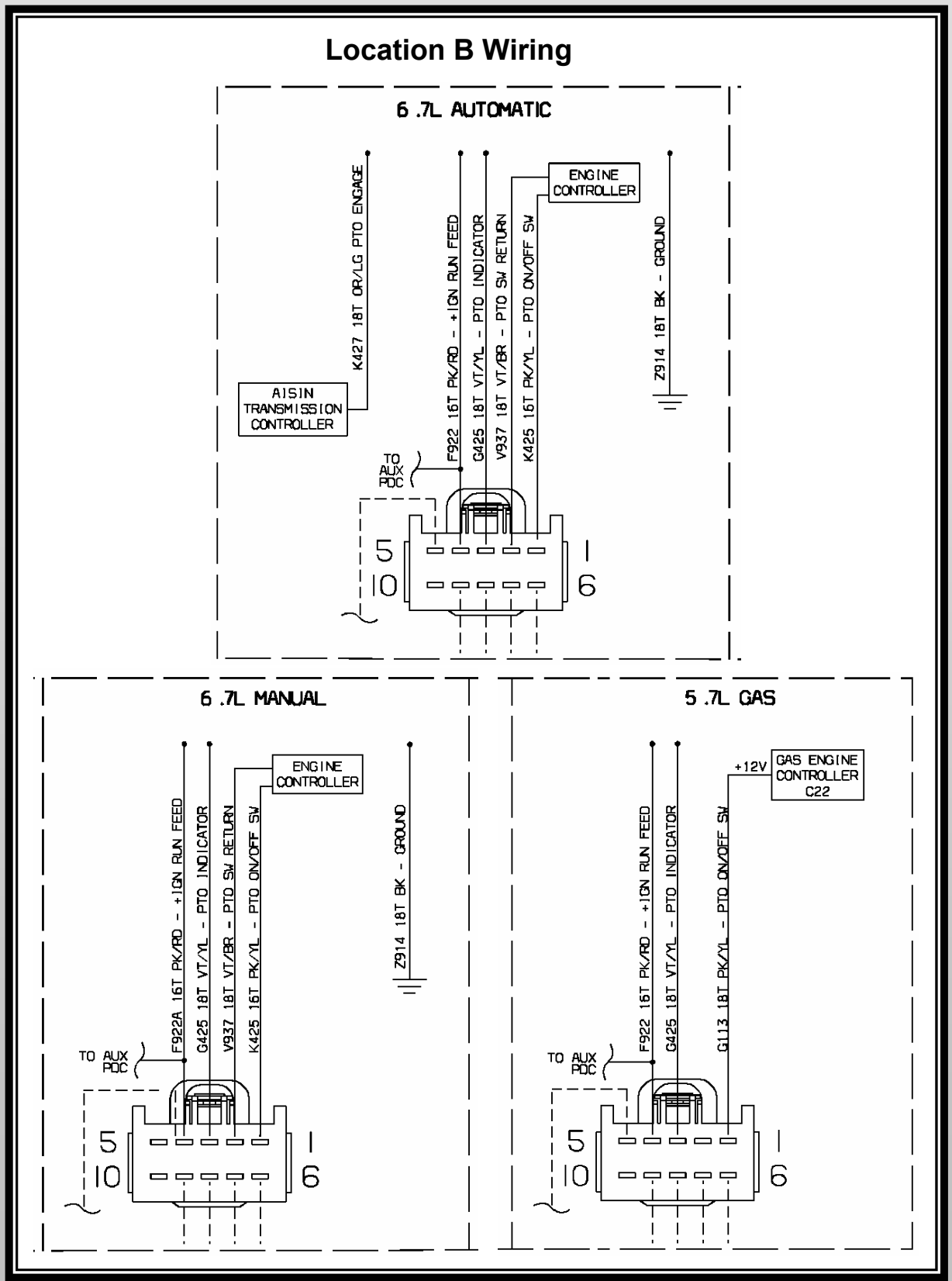
Circuit Name	Type/Gauge/Color	Circuit Functionality	Description	Usage
K854F	18T - VT/BR - for 2007 18T-DG- for 2008	remote throttle 5 volt supply	5 volt pwr supply to the remote potentiometer (remote's control power circuit). Supplied by the engine controller	Remote throttle control
K400E	18T - BR/VT	remote throttle sensor return (gnd)	Remote's ground (ground to the potentiometer of remote). Supplied by the engine controller. Do not hook to other grounding location	Remote throttle control
K128	18T - DB/WT	remote throttle signal	Remote signal sent to the engine controller. Signal from the remote's potentiometer.	Remote throttle control
K129	18T - DB/DG	remote throttle switch	On/Off switch provided by customer to "turn on/off remote function. Remote switch closes to ground. Connect ground side of switch to pin #8 in this connector. **Do not ground to vehicle**.	Remote throttle control
K119	18T - LG/BK	Maximum engine speed limit	Feature selects a lower maximum engine speed when switch is "on". Switch closes to ground. Customer supplied switch.Connect ground side of switch to pin #8 in this connector. **Do not ground to vehicle**.	Max operating speed switch
K810	18T - VT/DG	Accelerator interlock	Disable accelerator control of engine by closing an operator installed switch. This switch closes to ground. Connect ground side of switch to pin #8 in this connector. **Do not ground to vehicle**.	Customer supplied switch
F425	18T - PK	Remote PTO Swicth	Customer supplied remote PTO on/off switch. Switch closes to ground. Connect ground side of switch to pin #8 in this connector. **Do not ground to vehicle**.	Remote PTO
V937C	18T - VT/BR	Cruise control switch return	Electrical ground for switch circuits. Ground returns to the engine controller. Do not hook to other grounding location. All customer supplied PTO switches ground to this pin. Please make appropriate protected splice.	Master ground for all added PTO switches. Do not apply any "dirty" grounds to this location.
K425	18T - OR/BR - for 2007 18T-PK/YL - for 2008	PTO switch	Circuit switches to ground using operator installed switch. Connect ground side of switch to pin #8 in this connector. **Do not ground to vehicle**.	Stationary PTO

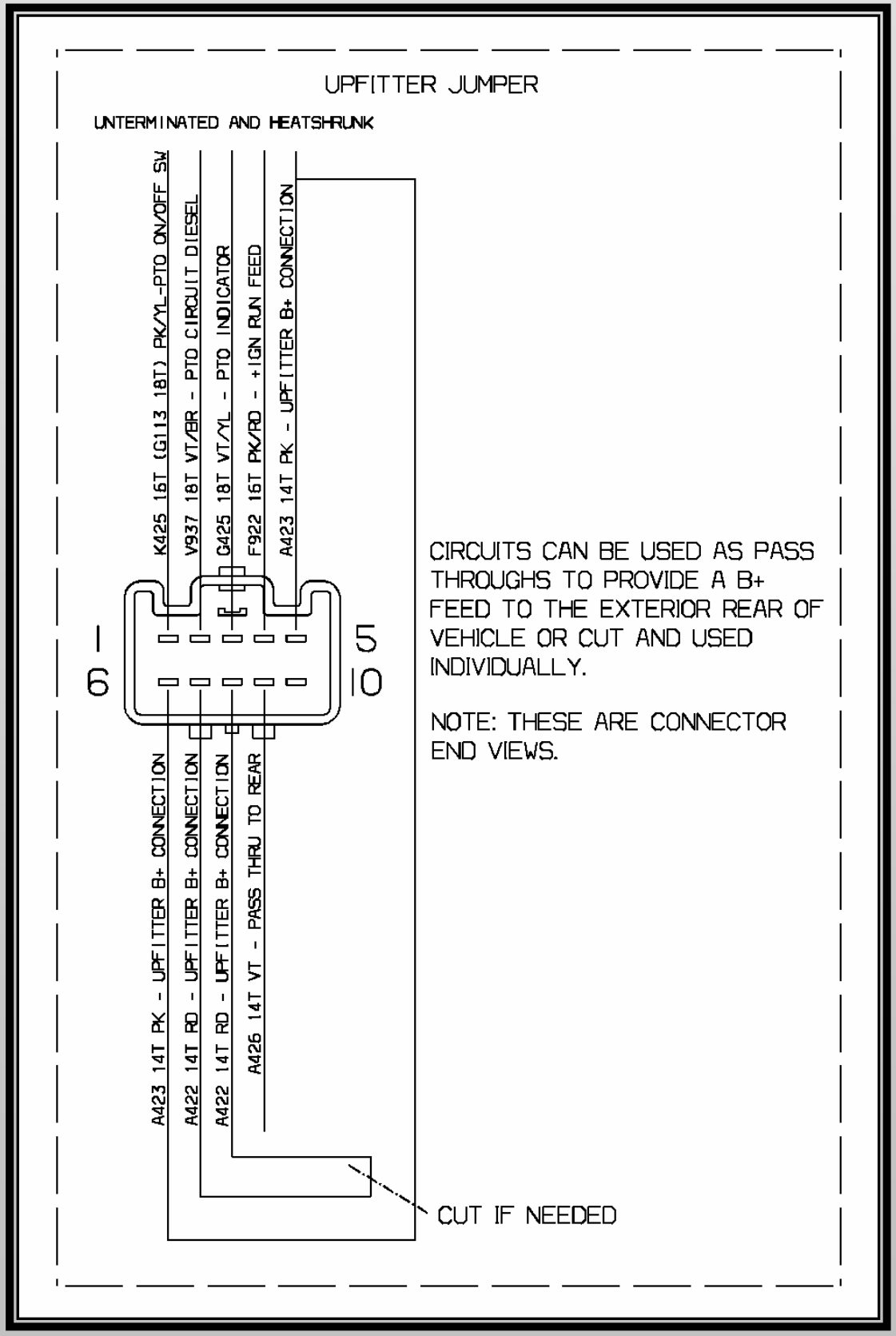
CHASSIS CAB UPFITTER KIT WIRING DETAIL



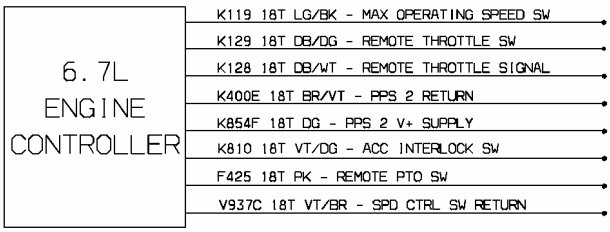

A
AUX PDC - LOCATED UNDERHOOD ON THE LEFT HAND SIDE
B
UNTERMINATED AND HEATSHRUNK LOCATED IN ENGINE COMPARTMENT BY MASTERCYLINDER. SEE ABOVE FOR DETAILS.
C
LOCATED UNDER THE INSTRUMENT PANEL NEAR GROMMET.
F
UNTERMINATED AND HEATSHRUNK LOCATED AT REAR OF FRAME
FROM AUX PDC
Z912 20T BK
F504 20T GY/PK
F922 16T PK/RD
A421 16T RD/WT
A422 14T RD
A423 14T PK
A420B 10T RD
A420C 10T RD
A420D 10T RD
20A
25A
25A
85
86
30
87
16AWG
B+
WIREFUSELINK
G100
TO 10A IN TIPM
F922B 16T PK/RD
B+ DASH INLINE
A426 14T VT
A422B 14T RD
A422A 14T RD
A423A 14T PK
DASH CHASSIS INLINE
A426 14T VT - PASS THRU TO CABIN
A422 14T RD - UPFITTER B+ CONNECTION
A423 14T PK - UPFITTER B+ CONNECTION
NOTE: 14T IS SHOWN HERE AS THE CIRCUIT GUAGE TO BE USED IF THE CIRCUITS ARE PROTECTED BY EITHER A 25A MINI OR MAXI FUSE, THE TOTAL CIRCUIT RESISTANCE IS LESS THAN 200mOhm AND THE CIRCUITS DO NOT HAVE A MINIMUM VOLTAGE DROP REQUIREMENT. CIRCUIT GAGE MUST BE REEVALUATED IF ANY OF THOSE CONDITIONS CHANGE.
UPSTOP SWITCH ONLY ON MANUAL VEHICLES
T26 18T DG/OR - CLUTCH UPSTOP SWITCH INPUT TO ENGINE CONTROL MODULE
CLUTCH UPSTOP SWITCH
Z993 18T BK
G101
ENGINE CONTROL MODULE B15
ENGINE
DASH
TOP VIEW OF PDC
EMPTY RELAY CAVITY
PTO POWER MICRO-RELAY
IGNITION FEED
BATT FEED
BATT FEED
REPLACEMENT PART INFORMATION:
RELAY (SUPPLIER: TYCO)
P/N: 4671168E
RELAY TERMINAL (SUPPLIER: MOLEX)
P/N: 33113-0003 AND 33113-0005
FUSE (SUPPLIER: LITTELFUSE)
P/N: 0299020.ZXOCR (20A)
P/N: 0299025.ZXOCR (25A)

Location B Wiring


6.7L AUTOMATIC
K427 18T OR/LG PTO ENGAGE
AISIN TRANSMISSION CONTROLLER
ENGINE CONTROLLER
F922 16T PK/RD - +IGN RUN FEED
G425 18T VT/YL - PTO INDICATOR
V937 18T VT/BR - PTO SW RETURN
K425 16T PK/YL - PTO ON/OFF SW
Z914 18T BK - GROUND
TO AUX PDC
5
10
1
6
6.7L MANUAL
F922A 16T PK/RD - +IGN RUN FEED
G425 18T VT/YL - PTO INDICATOR
V937 18T VT/BR - PTO SW RETURN
K425 16T PK/YL - PTO ON/OFF SW
Z914 18T BK - GROUND
ENGINE CONTROLLER
TO AUX PDC
5.7L GAS
F922 16T PK/RD - +IGN RUN FEED
G425 18T VT/YL - PTO INDICATOR
G113 18T PK/YL - PTO ON/OFF SW
+12V
GAS ENGINE CONTROLLER C22
TO AUX PDC


UPFITTER JUMPER
UNTERMINATED AND HEATSHRUNK
K425 16T (G113 18T) PK/YL-PTO ON/OFF SW
V937 18T VT/BR - PTO CIRCUIT DIESEL
G425 18T VT/YL - PTO INDICATOR
F922 16T PK/RD - +IGN RUN FEED
A423 14T PK - UPFITTER B+ CONNECTION
6
1
5
10
A423 14T PK - UPFITTER B+ CONNECTION
A422 14T RD - UPFITTER B+ CONNECTION
A422 14T RD - UPFITTER B+ CONNECTION
A426 14T VT - PASS THRU TO REAR
CIRCUITS CAN BE USED AS PASS THROUGHS TO PROVIDE A B+ FEED TO THE EXTERIOR REAR OF VEHICLE OR CUT AND USED INDIVIDUALLY.
NOTE: THESE ARE CONNECTOR END VIEWS.
CUT IF NEEDED

(D) PTO CONNECTOR AND PINOUT


6.7L
ENGINE
CONTROLLER
K119 18T LG/BK - MAX OPERATING SPEED SW
K129 18T DB/DG - REMOTE THROTTLE SW
K128 18T DB/WT - REMOTE THROTTLE SIGNAL
K400E 18T BR/VT - PPS 2 RETURN
K854F 18T DG - PPS 2 V+ SUPPLY
K810 18T VT/DG - ACC INTERLOCK SW
F425 18T PK - REMOTE PTO SW
V937C 18T VT/BR - SPD CTRL SW RETURN

UNTERMINATED AND HEATSHRUNK LOCATED UNDER VEHICLE ON TRANSMISSION BRACKET.

(F) TRAILER TOW CIRCUITS

(UNTERMINATED AND HEATSHRUNK REAR OF FRAME)

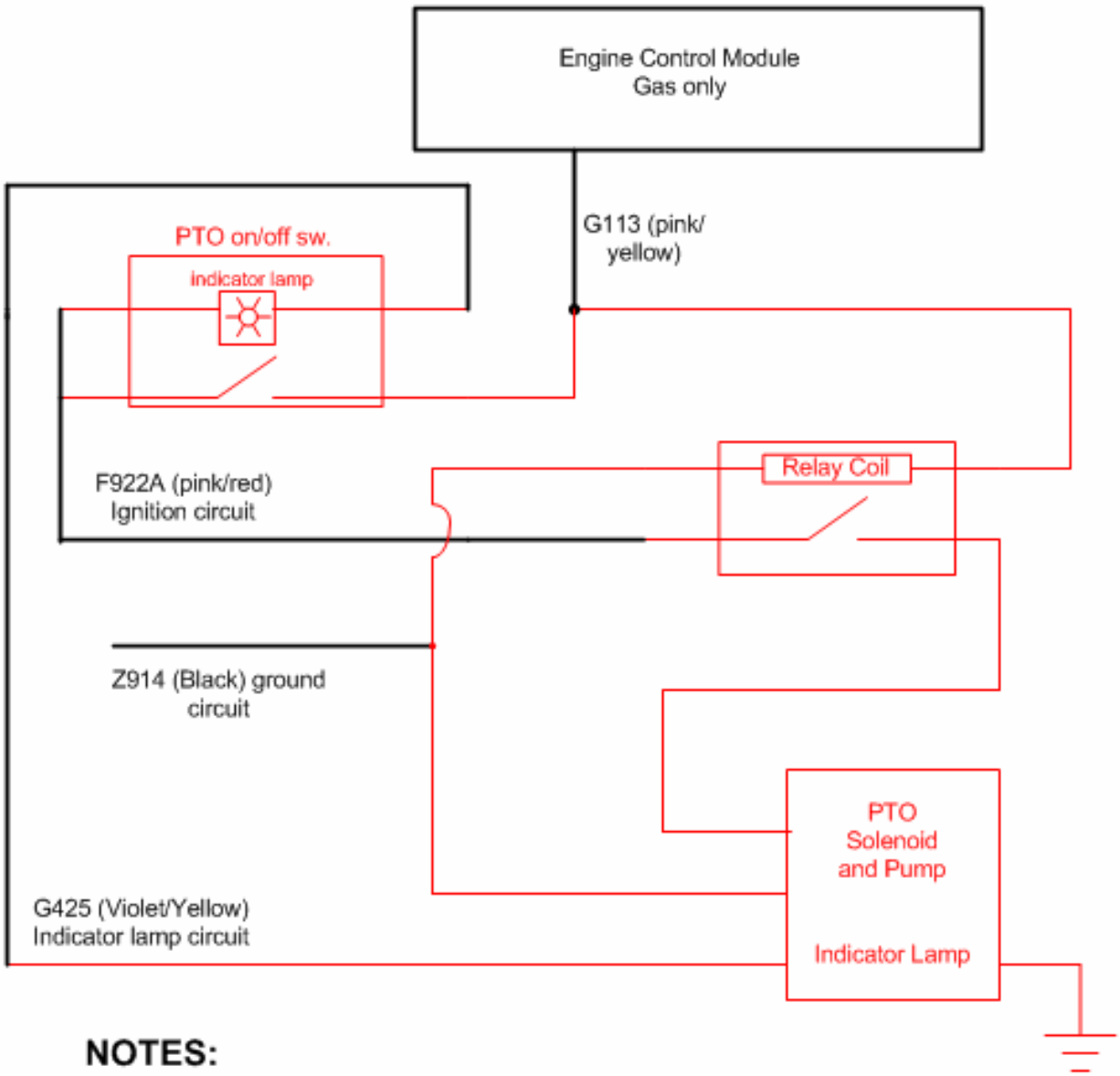
CIRCUIT	GUAGE	COLOR	FUNCTION
A100	14	RD/VT	TRAILER TOW B+ FEED(30A MAX)
B40	14	DG	ELECTRIC BRAKE FEED
L1E	18	WT/LG	BACKUP LAMPS
L673	18	YL	LEFT STOP/TURN
L674	18	LG	RIGHT STOP/TURN
L678	18	BR	TRAILER TOW PARK LAMPS
Z927BD	12	BK	GROUND

(G) UPFITTER CIRCUITS

(UNTERMINATED AND HEATSHRUNK REAR OF FRAME)

CIRCUIT	GUAGE	COLOR	FUNCTION
A422A	14	RD	UPFITTER B+ FEED (25A MAX)
A423A	14	PK	UPFITTER B+ FEED (25A MAX)
A426	14	VT	PASS THROUGH TO CABIN
L7	18	WT/YL	UPFITTER PARK LAMP FEED (6A MAX)
L50B	18	WT/TN	STOP LAMPS

5.7L Gas G56 Manual Transmission Stationary in Cab and Mobile Mode



NOTES:

F922A, G425, G113 and Z914 can be found underhood as one of the unterminated circuits located on left side near dash panel

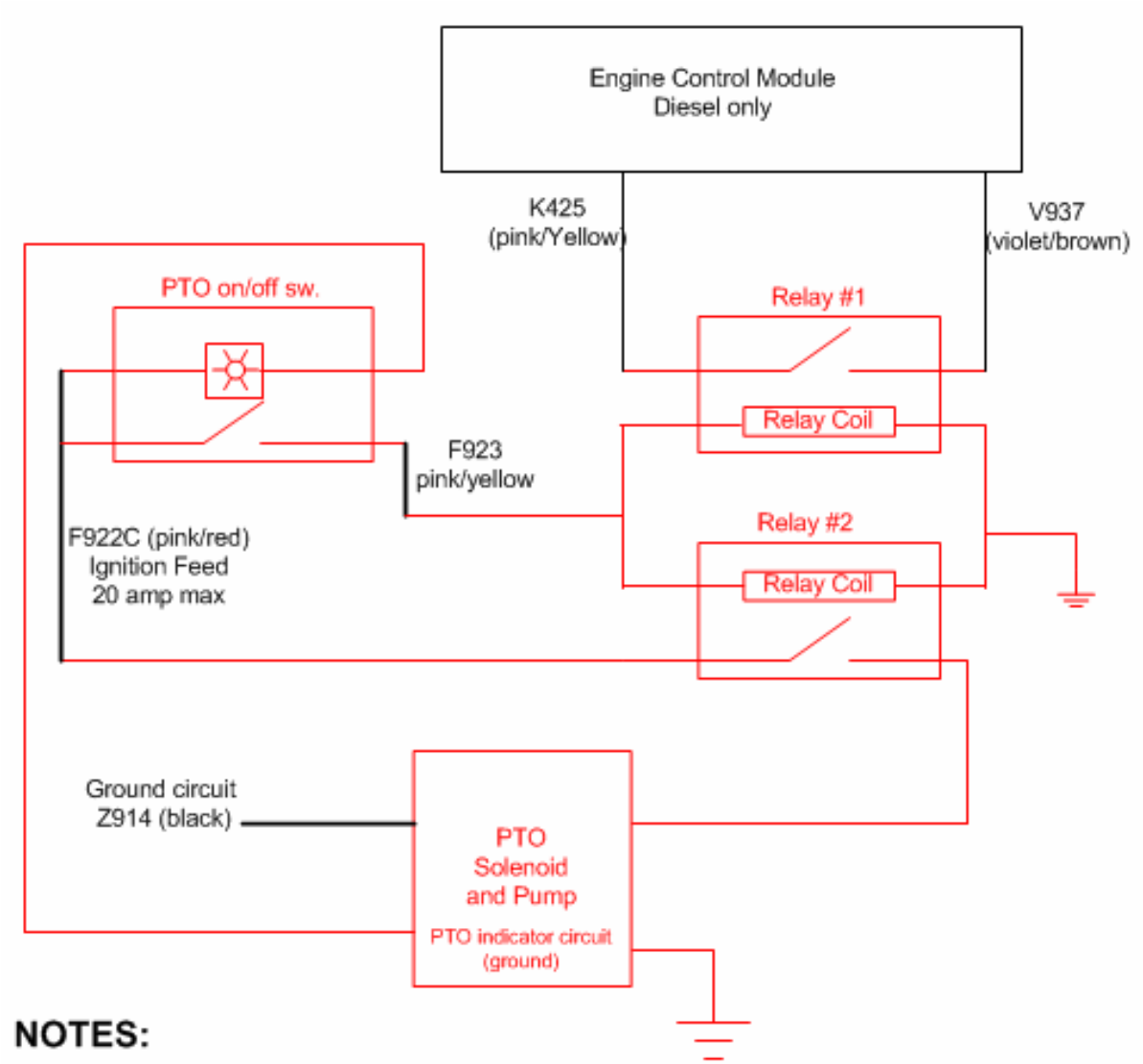
All other wiring , switches, relays and other components will need to be provided by the PTO installer. Anything in black comes with the truck

The PTO switch is assumed to be installed inside the cab.

Upfitter relays can be mounted to the Aux PDC bracket.

For further wiring and circuit definition PLEASE CLICK HERE

6.7L Diesel Electric Air Shift with G56 Manual Transmission



NOTES:

K425, V937 and K427 are circuits that can be found located near the left side at top of bell housing

F922C, F923 and Z914 can be found underhood as one of the unterminated circuits located on left side near dash panel

All other wiring , switches, relays and other components will need to be provided by the PTO installer. Anything in black comes with the truck

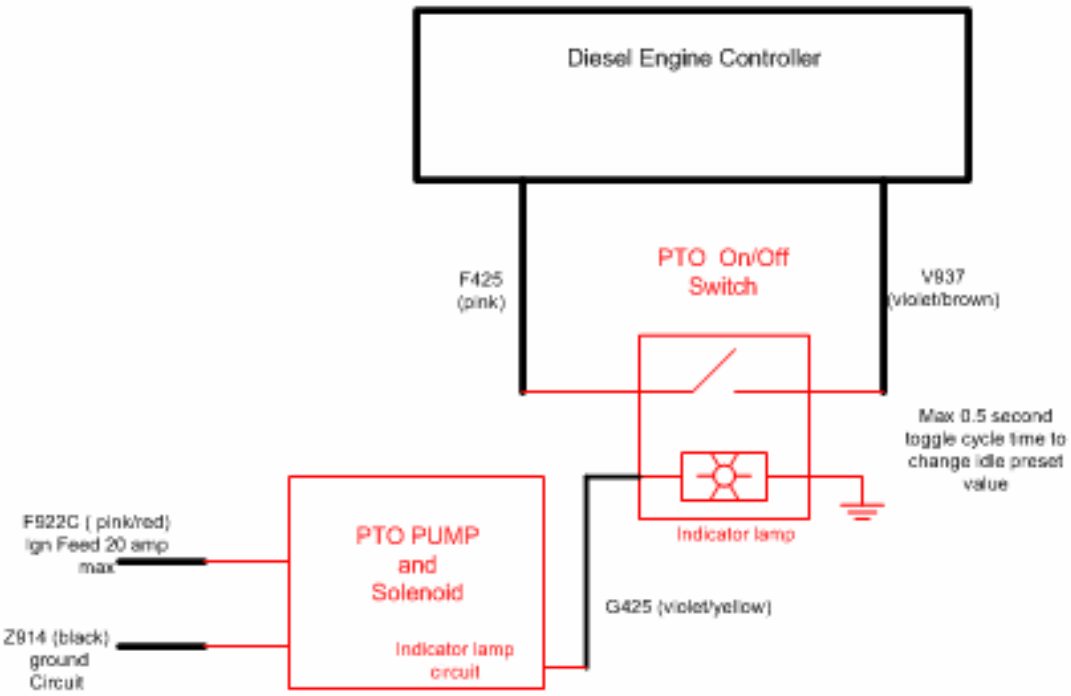
The PTO switch is assumed to be installed inside the cab.

Upfitter relays can be mounted to the Aux PDC bracket.

Do NOT externally ground circuit V937 to anything.

For further wiring and circuit definition PLEASE CLICK HERE

6.7L Diesel PTO with G56 Manual Transmission Stationary Remote Preset Mode



NOTES:

V937 and F425 are circuits that can be found located near the left side at top of bell housing

F922C, G425 and Z914 can be found underhood as one of the unterminated circuits located on left side near dash panel

All other wiring , switches, relays and other components will need to be provided by the PTO installer

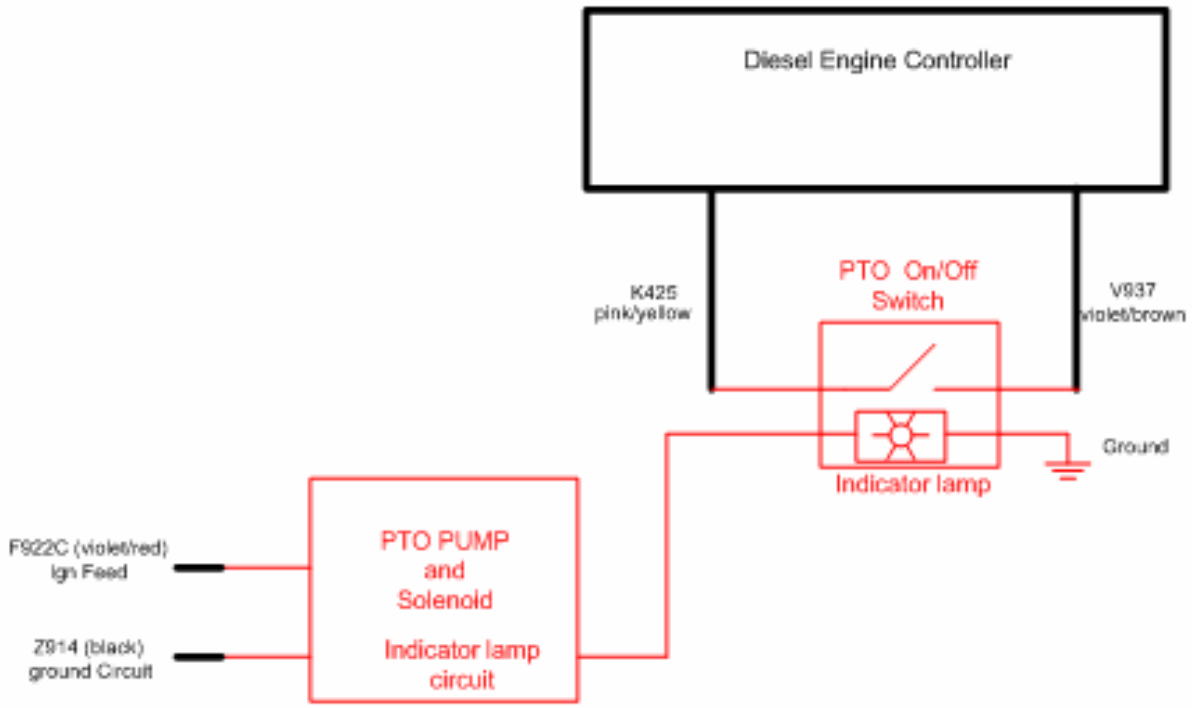
Do NOT externally ground circuit V937 to anything.

For further wiring and circuit definition (i.e. gauge, color, etc...) PLEASE CLICK HERE

Preset Operation
Turn ON the PTO ON/OFF Switch, engine goes to first preset (900 RPM)_ and ECU disables OBDII

Next toggle the PTO ON/OFF Switch (ON/OFF/ON) to go to next engine speed preset (total of five presets)

6.7L Diesel PTO with G56 Manual Transmission Stationary and Mobile Mode



NOTES:

V937 and F425 are circuits that can be found located near the left side at top of bell housing

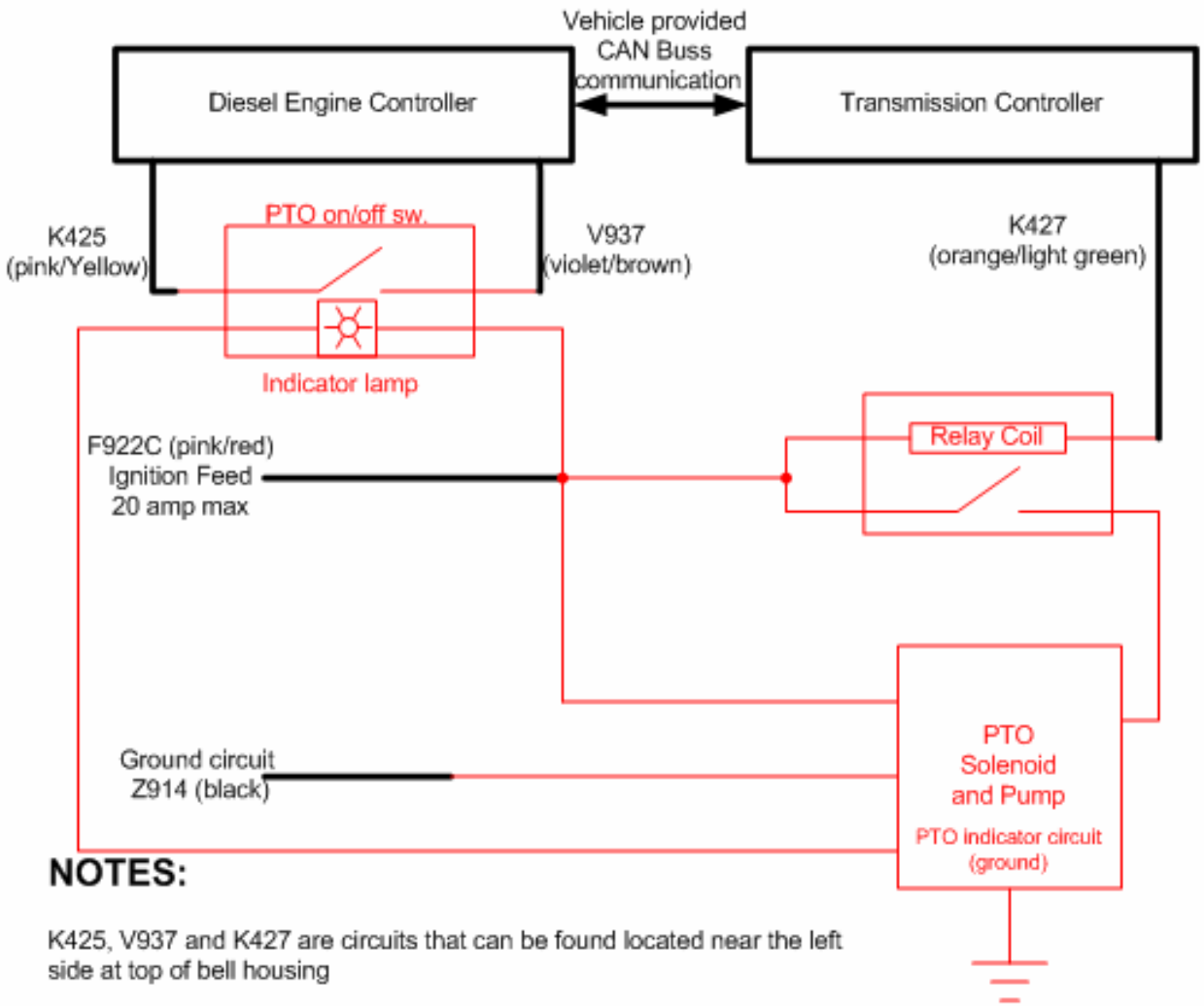
F922C and Z914 can be found underhood as one of the unterminated circuits located on left side near dash panel

All other wiring , switches, relays and other components will need to be provided by the PTO installer

Do NOT externally ground circuit V937 to anything.

For further wiring and circuit definition (i.e. gauge, color, etc...) PLEASE CLICK HERE

6.7L Diesel with Aisin Automatic Transmission in Cab Stationary and Mobile Mode



NOTES:

K425, V937 and K427 are circuits that can be found located near the left side at top of bell housing

F922C and Z914 can be found underhood as one of the unterminated circuits located on left side near dash panel

All other wiring , switches, relays and other components will need to be provided by the PTO installer. Anything in black comes with the truck

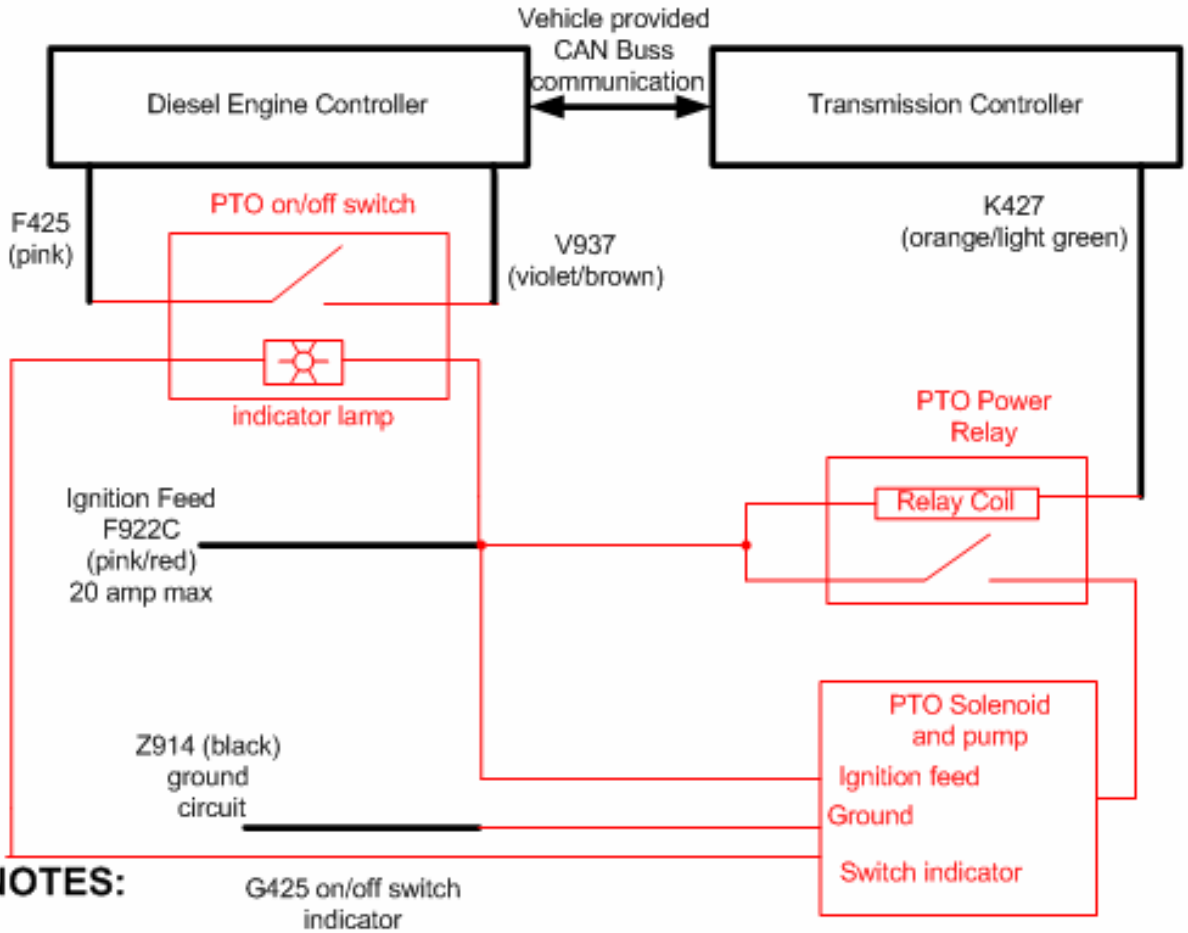
The PTO switch is assumed to be installed inside the cab.

Upfitter relays can be mounted to the Aux PDC bracket.

Do NOT externally ground circuit V937 to anything.

For further wiring and circuit definition PLEASE CLICK HERE

6.7L Diesel with Aisin Automatic Transmission Stationary Remote Mode



NOTES:

F425, V937 and K427 are circuits that can be found located near the left side at top of bell housing

F922C, G425 and Z914 can be found underhood as one of the unterminated circuits located on left side near dash panel

All other wiring , switches, relays and other components will need to be provided by the PTO installer

Do NOT externally ground circuit V937 to anything.

For further wiring and circuit definition (i.e. gauge, color, etc...) PLEASE CLICK HERE